

Skin and Mucosal Delivery II

NESTERKINA MARIIA

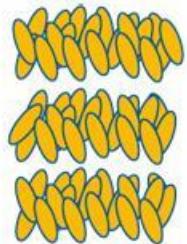
ADVANCES IN CONTROLLED TRANSDERMAL
DELIVERY OF ANTITUBERCULAR DRUGS



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Concept of investigation



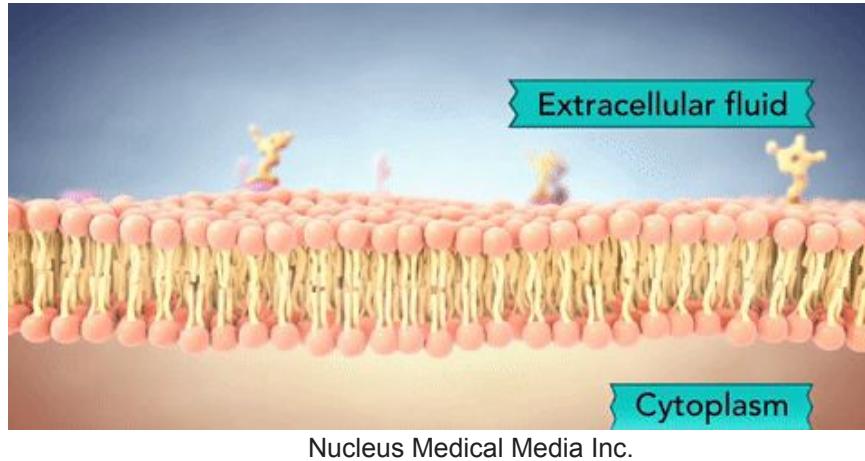
Liquid crystals
Stimuli

Temperature 

Light 

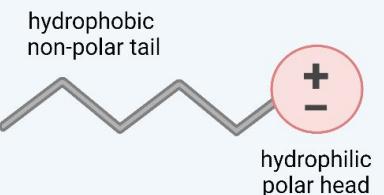
Magnetic field 

Electric field 



Liquid crystals

Lyotropic



- Phase transition depends on temperature and concentration

Thermotropic



- Phase transition depends on temperature

Liquid-crystalline nature of the lipid bilayer

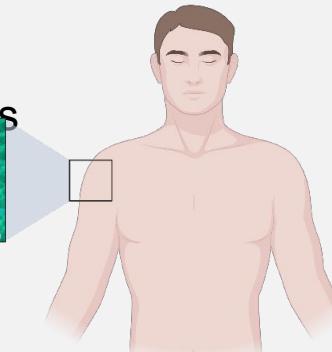


Phospholipids form a smectic A phase



Strategy

Liquid crystals



Thermotropic liquid crystals for skin drug delivery

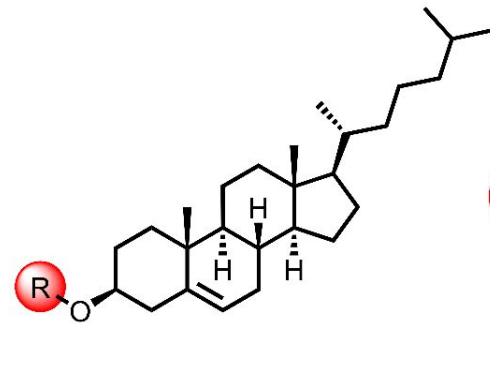
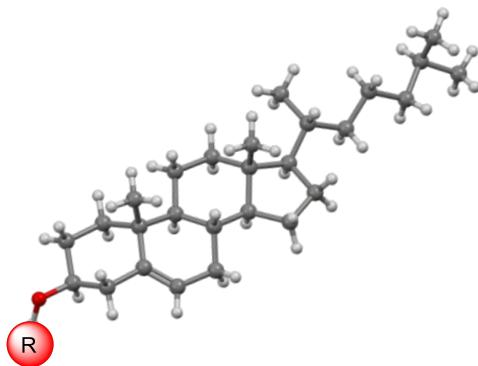


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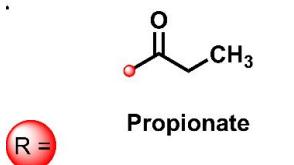
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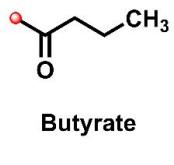
Thermotropic liquid crystal systems based on cholesteryl esters



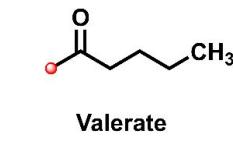
Cholesteryl esters



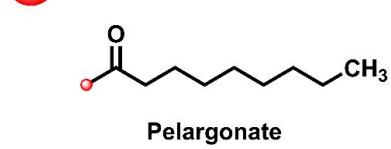
Propionate



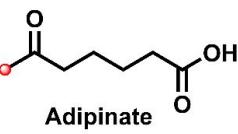
Butyrate



Valerate



Pelargonate



Adipinate

System 1

- Cholesteryl pelargonate (50%)
- Cholesteryl valerate (25%)
- Cholesteryl butyrate (25%)

System 2

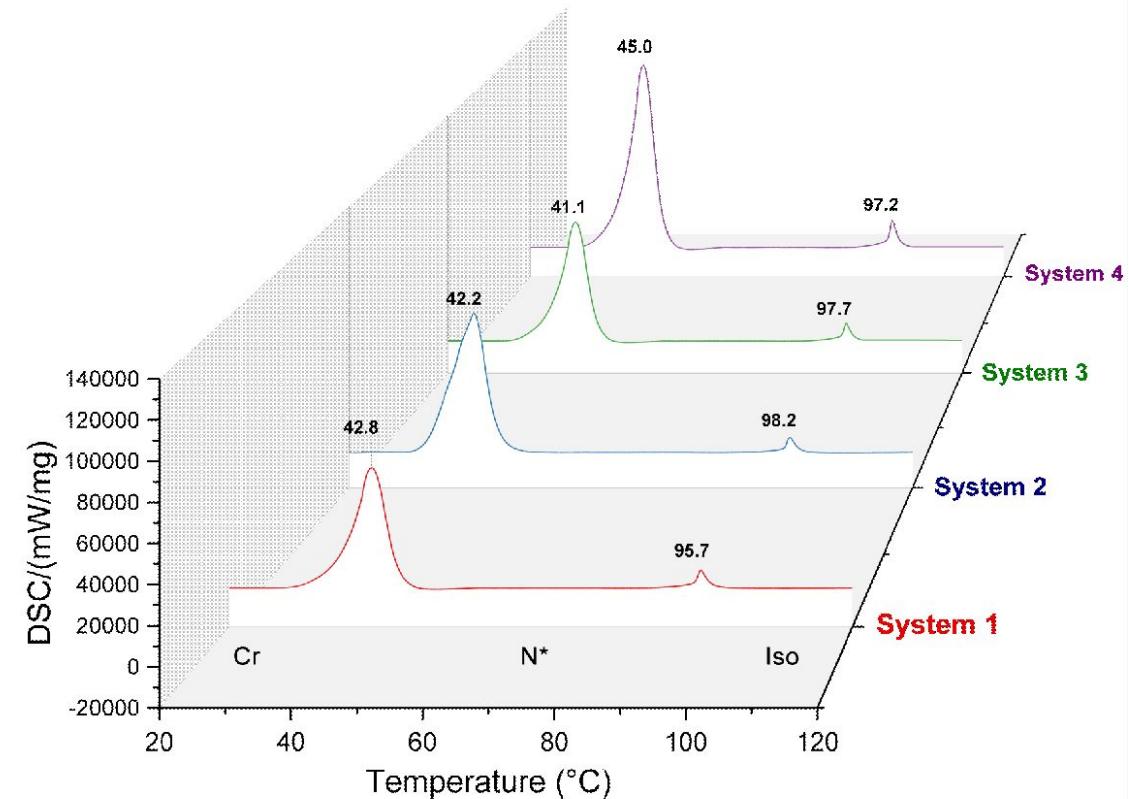
- Cholesteryl pelargonate (50%)
- Cholesteryl propionate (25%)
- Cholesteryl butyrate (25%)

System 3

- Cholesteryl pelargonate (50%)
- Cholesteryl adipinate (25%)
- Cholesteryl butyrate (25%)

System 4

- Cholesteryl pelargonate (50%)
- Cholesteryl adipinate (25%)
- Cholesteryl propionate (25%)



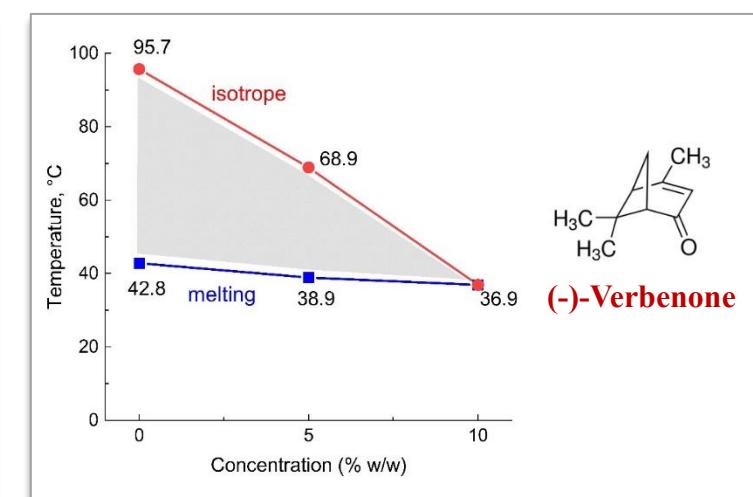
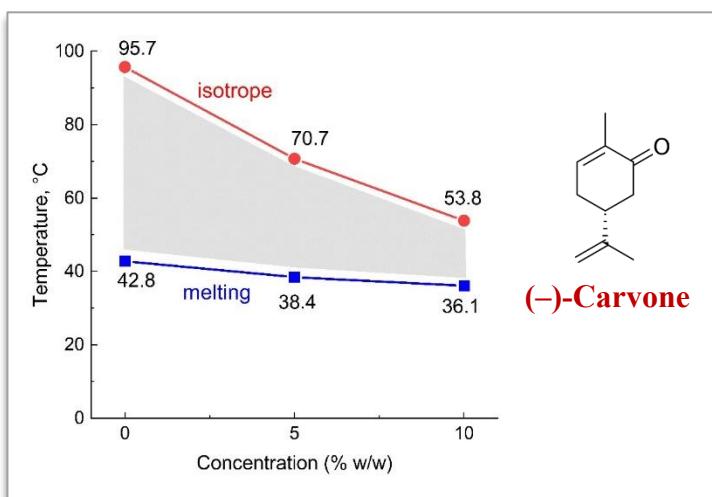
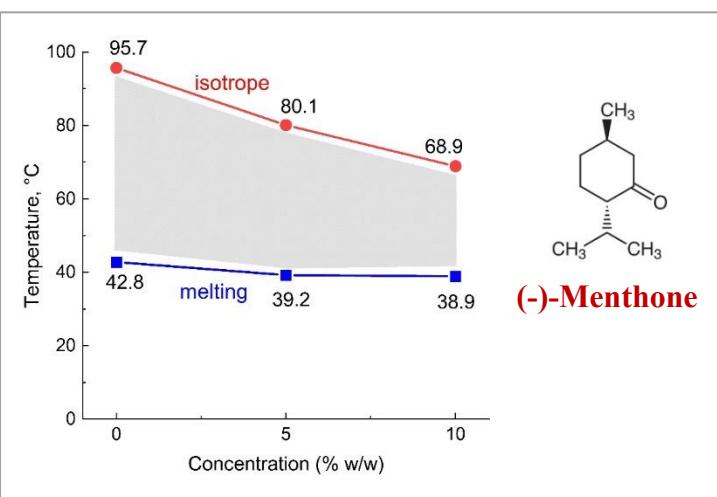
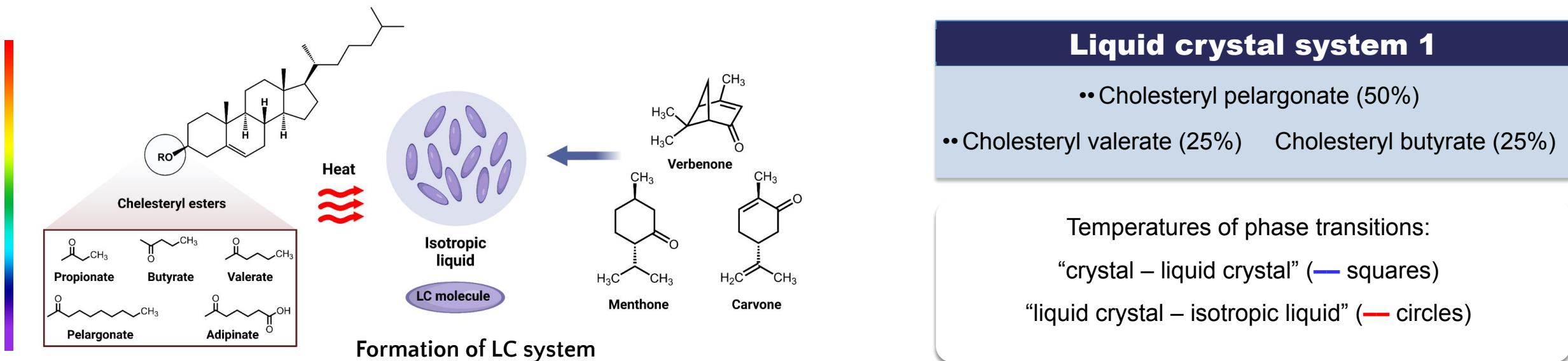
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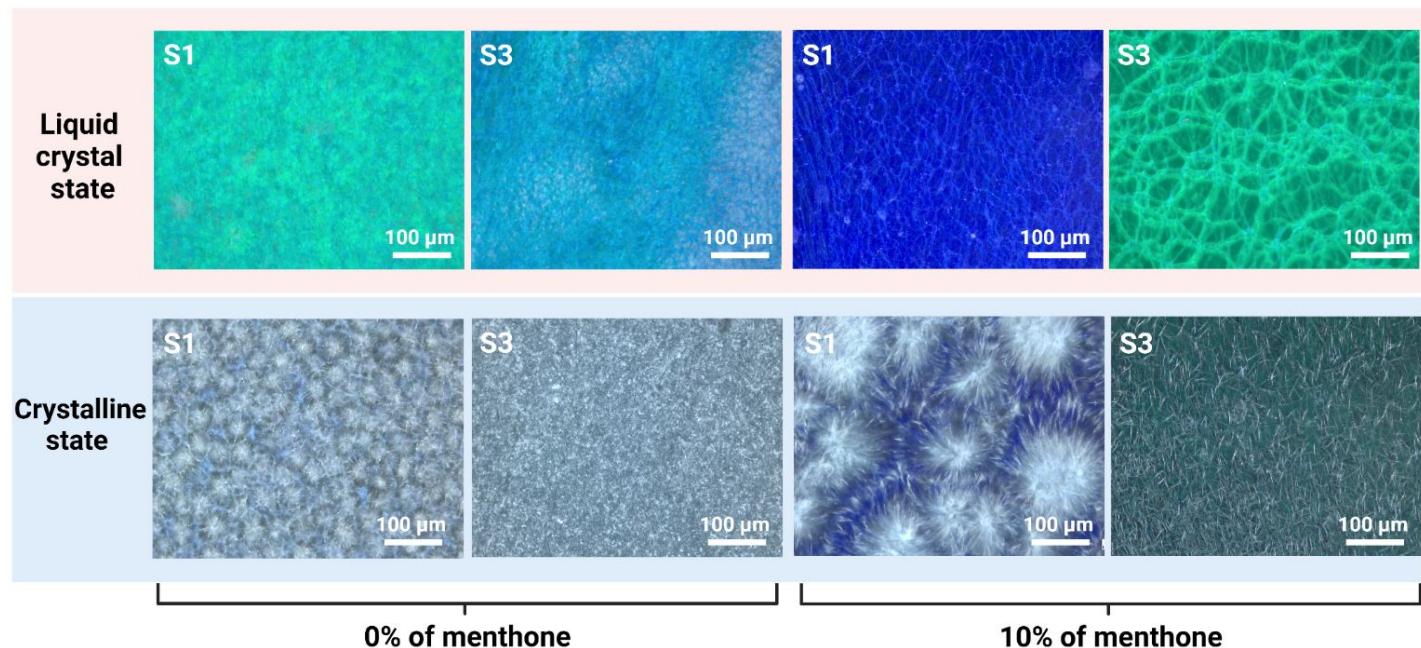
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Optimisation of cholesteric liquid crystal systems



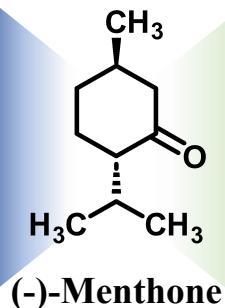
Liquid crystal state

Polarizing optical microscopic observation of phase transitions



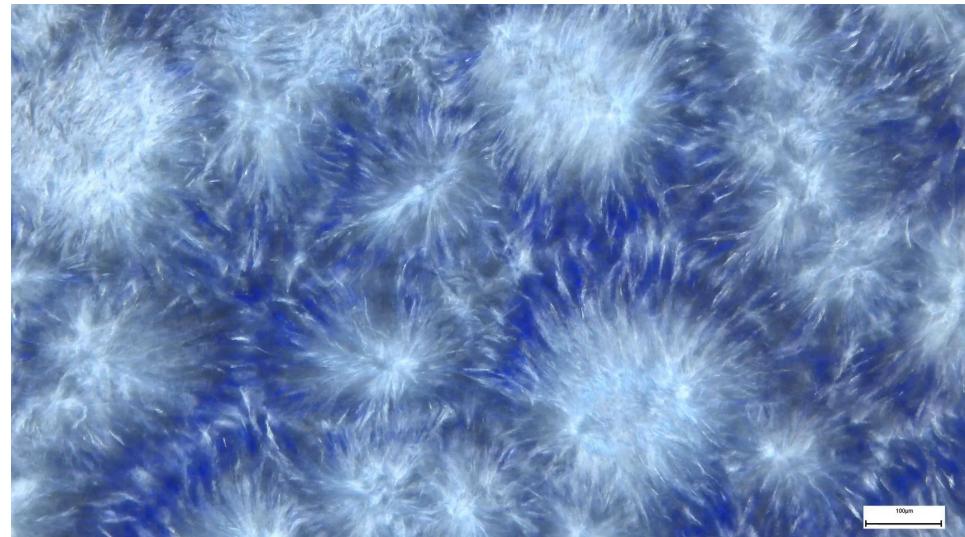
System 1

- Cholesteryl pelargonate (50%)
- Cholesteryl valerate (25%)
- Cholesteryl butyrate (25%)



System 3

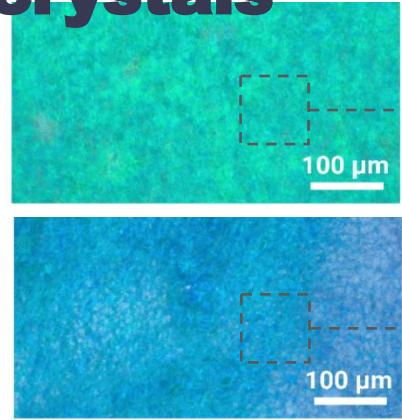
- Cholesteryl pelargonate (50%)
- Cholesteryl adipinate (25%)
- Cholesteryl butyrate (25%)



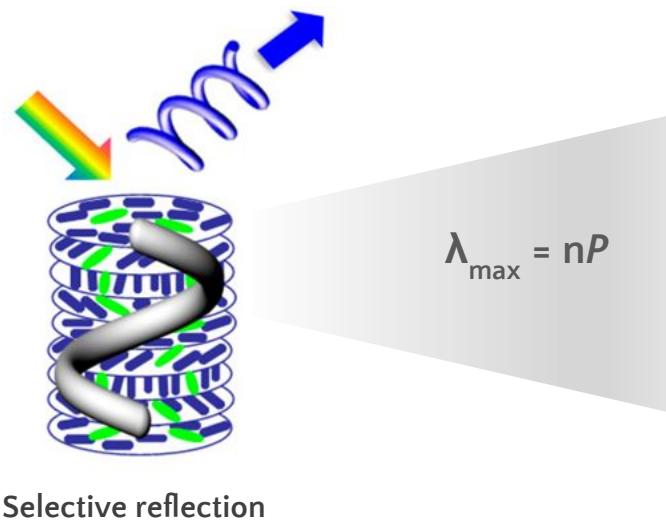
Phase transition of liquid crystals on the surface such as skin


System 1 with 10% of menthone

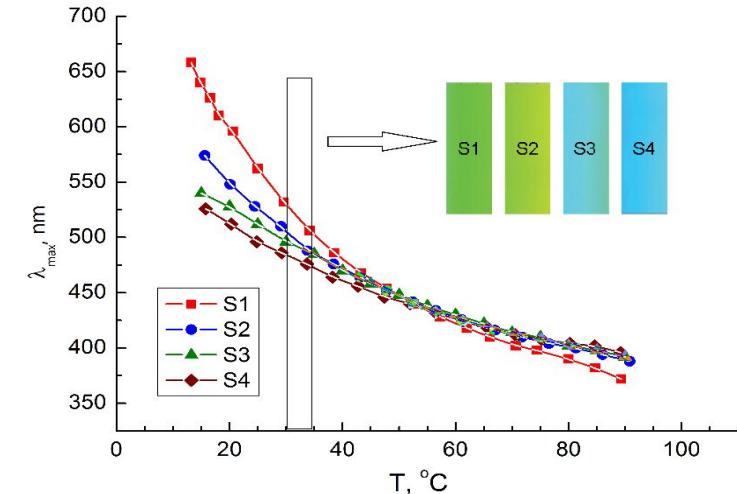
Composition-dependent pitch variability in cholesteric liquid crystals



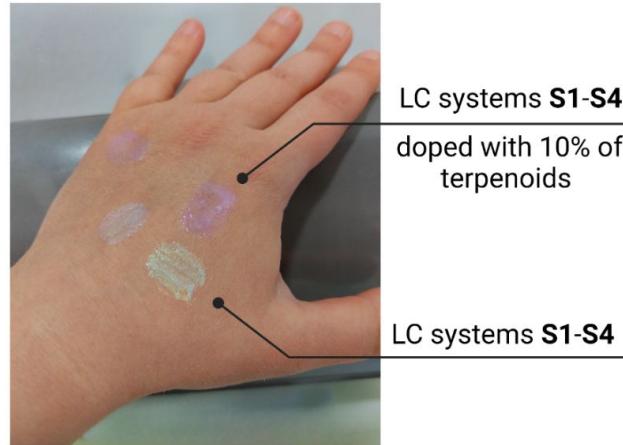
Optical polarizing microscope textures



Selective reflection



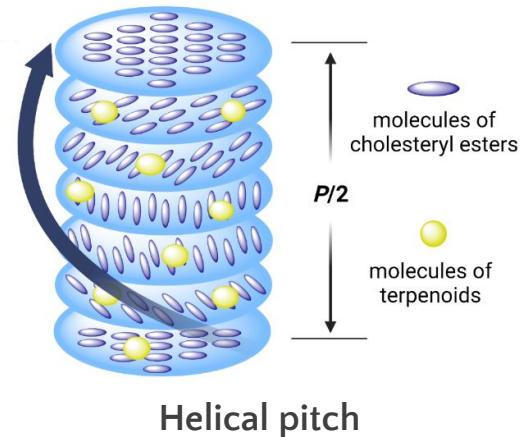
Color-temperature characteristic of LC systems



Phase transition on the skin surface

The helical pitch 410–450 nm corresponding to █ 'violet to blue' color.

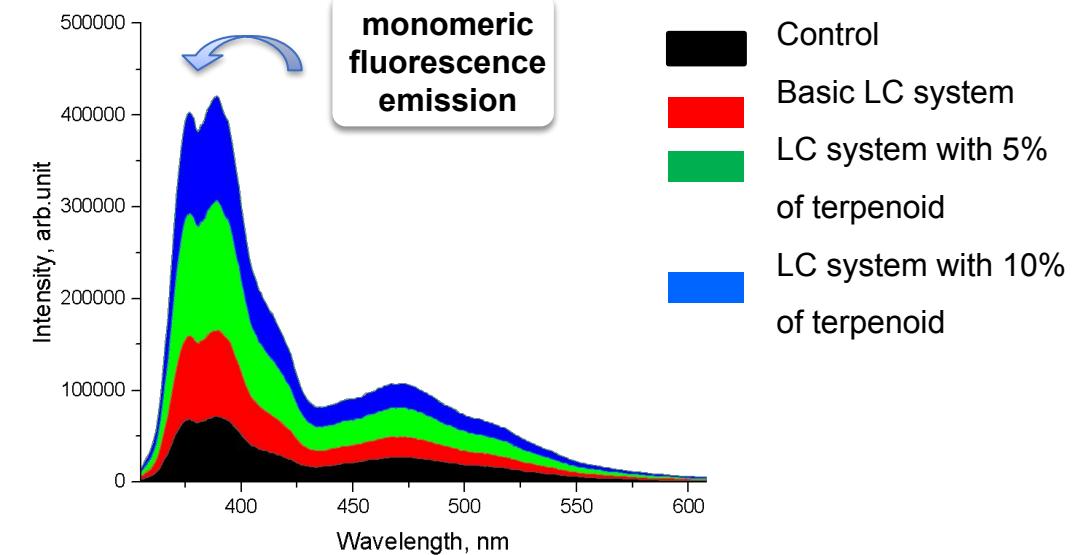
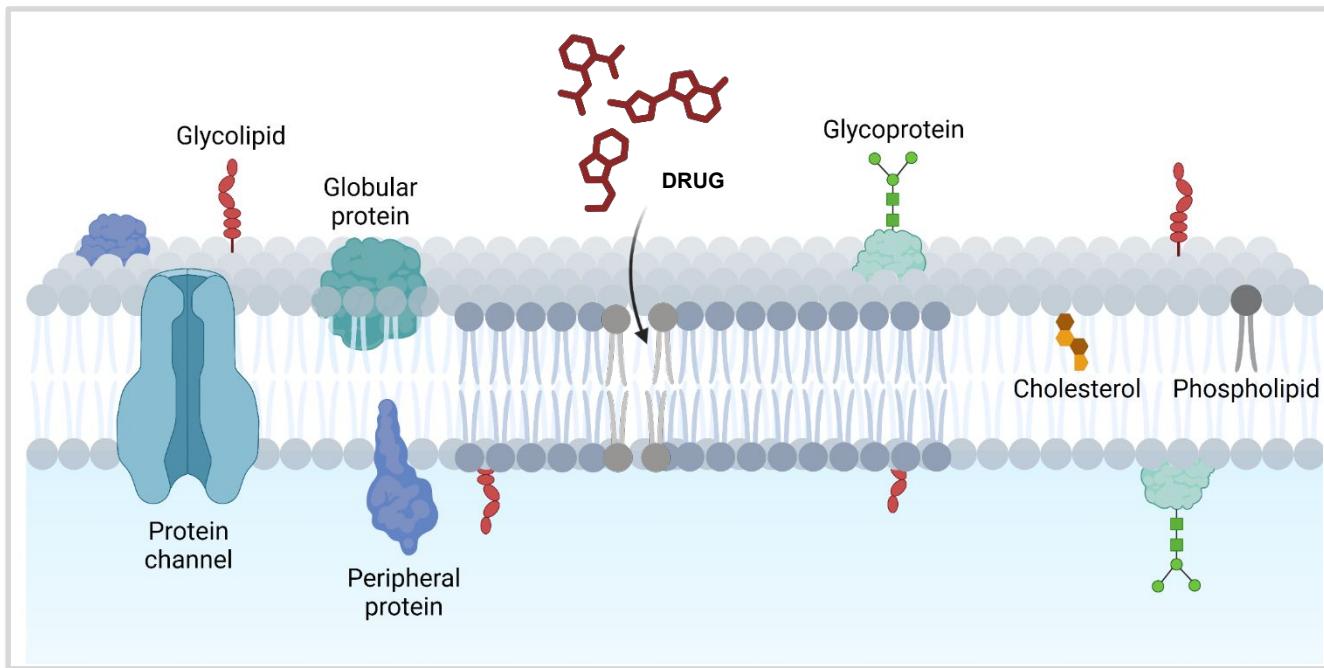
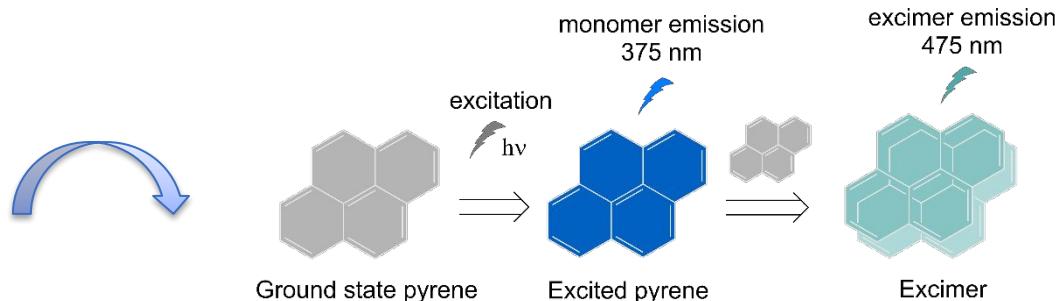
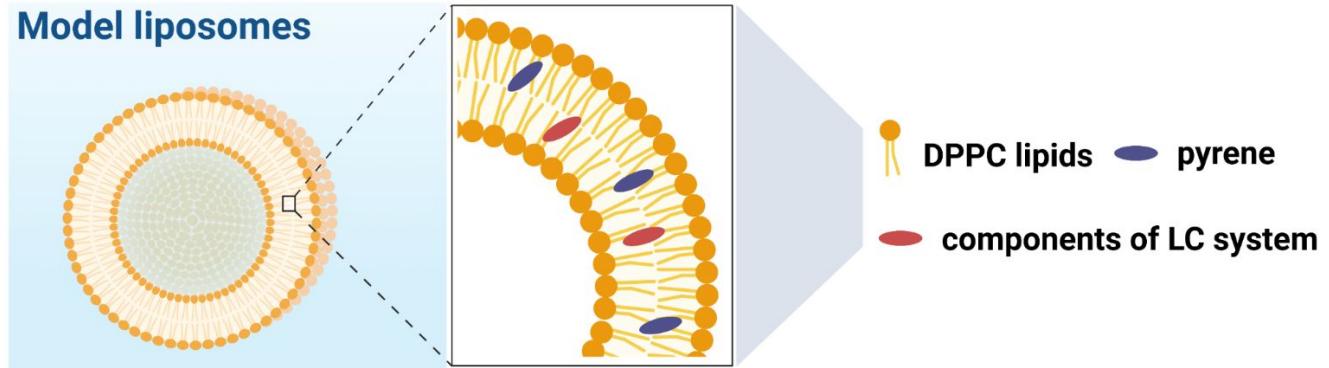
The helical pitch 490–570 nm corresponding to █ 'blue to green' color of the system.



Helical pitch

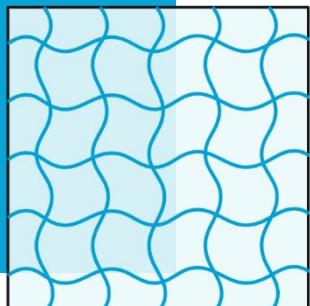
The impact of liquid crystals on biological membrane structure

Model liposomes



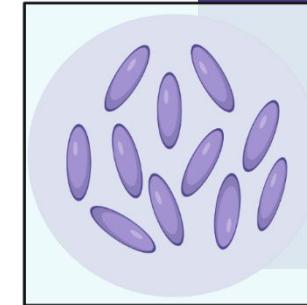
Polymer-dispersed liquid crystal films for skin drug delivery

- Sodium alginate
- Hyaluronic acid
- Glycerol
- Water

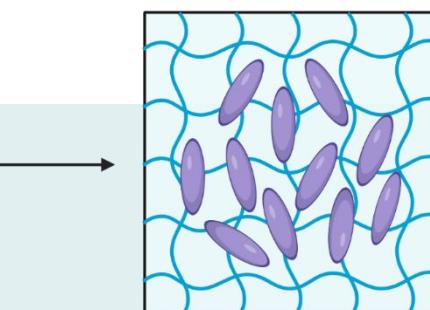
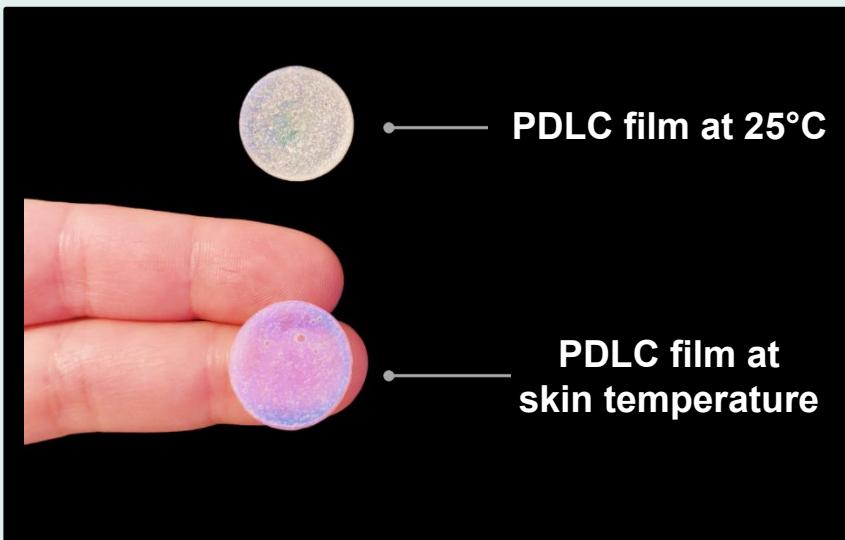


Polymer matrix

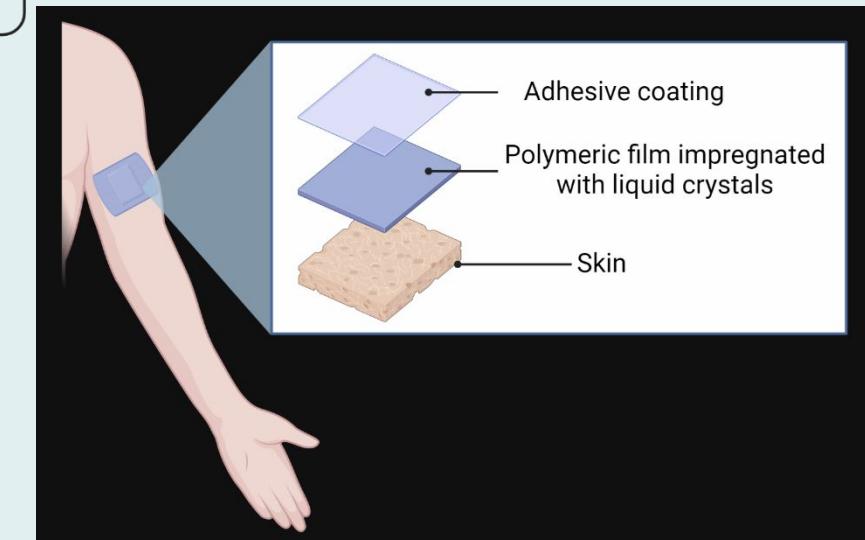
- Cholesteryl pelargonate
- Cholesteryl valerate
- Cholesteryl butyrate
- Menthone

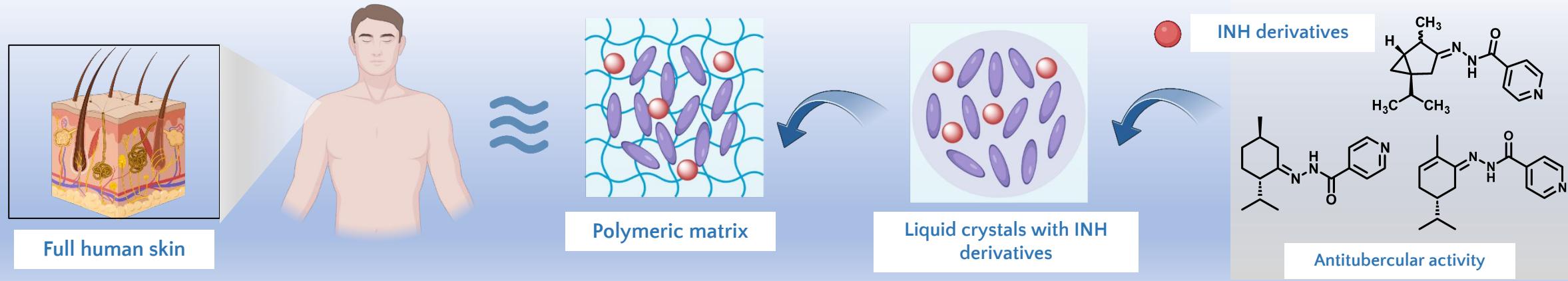


Liquid crystal system

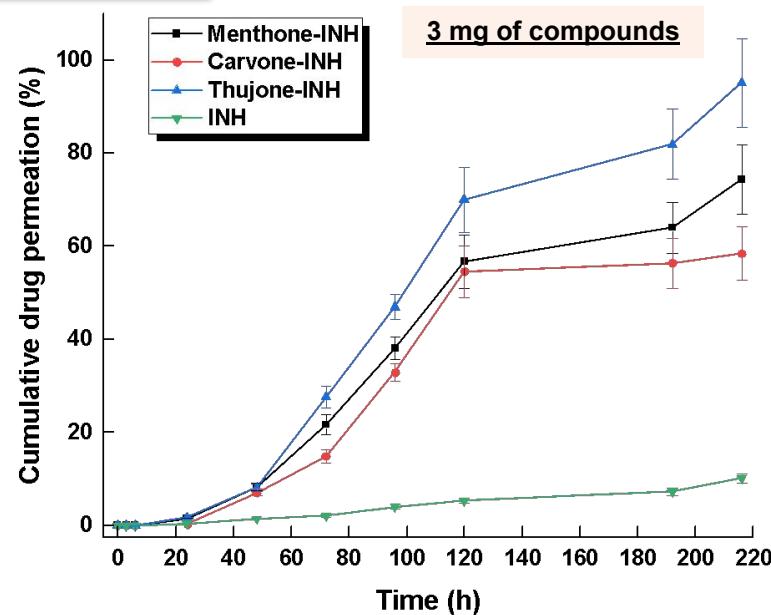
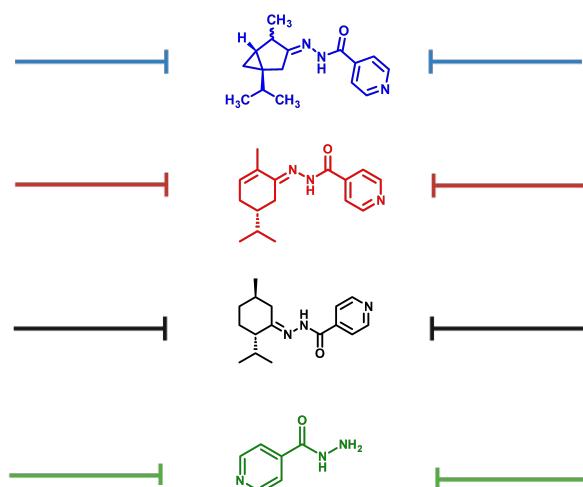
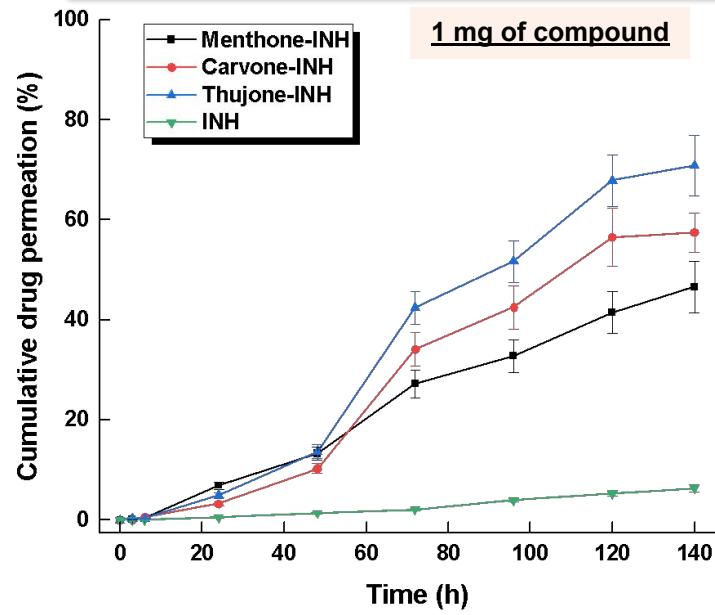


Polymer-dispersed liquid crystal (PDLC) films





Cumulative amount of isoniazid (INH) derivatives penetrated through the full human skin



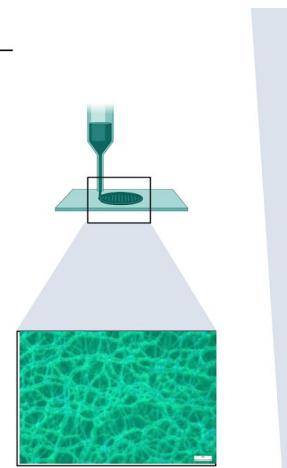
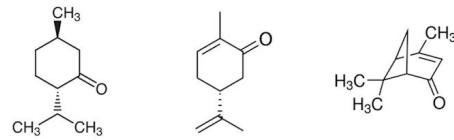
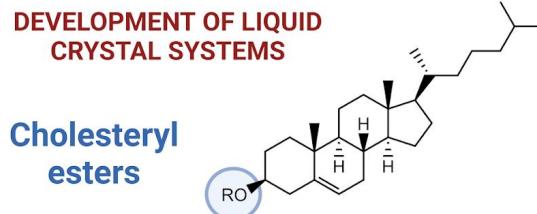
Summary



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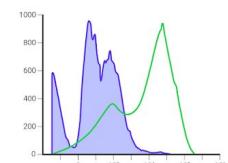
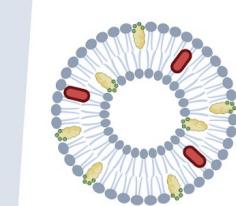
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INTERACTION BETWEEN LIQUID CRYSTAL SYSTEMS AND PHOSPHOLIPIDS

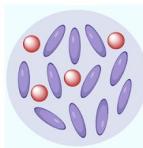
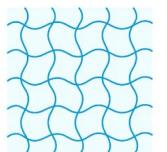
Fluorescence probe
LC systems

Fluorescence probe technique

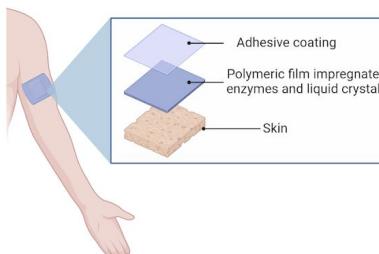


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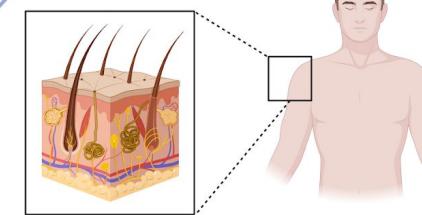
FABRICATION OF
POLYMER-DISPERSED
LIQUID CRYSTAL FILMS



Polymer-dispersed liquid crystal films with anti-TB compound



PERMEABILITY THROUGH
HUMAN SKIN

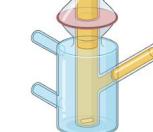


Full human skin



Franz cell

LC polymeric films with
incorporated drug



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Acknowledgment

HIPS

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